

## chapter12\_3\_1 Modeling in the Frequency Domain for Example 12.6

```
% Onwubolu, G. C.
% Mechatronics: Principles & Applications
% Elsevier
%
% Mechatronics: Principles & Applications Toolbox Version 1.0
% Copyright © 2005 by Elsevier
%
% Chapter 12.3: Modeling in the Time Domain
%
% Example 12.6: State-space representations can be converted to transfer
functions
% represented by a numerator and a denominator using [num,den] =
ss2tf(A,B,C,D,iu),
% where iu is the input number for multiple-input systems. For single-input,
% single-output systems iu = 1. For an LTI state-space system, Tss, the
conversion
% can be implemented using Ttf = tf(Tss) to yield the transfer function in
polynomial
% form or Tzpk = zpk(Tss) to yield the transfer function in factored form. For
example,
% the transfer function represented by the matrices described in (ch3p3)
% can be found as follows:

'Example 12.6'           % Display label.
  'Non LTI'             % Display label.
A=[0 1 0 0 0 0;-1 0 0.25 0 0 0;0 0 0 1 0 0;0.5 0 -1 0 0.5 0;0 0 0 0 0 1;0 0 1 0 -1
0]; % Represent A.
B=[0;1;0;0;0;2];       % Represent B.
C=[0 1 0 0 0 1];       % Represent C.
D=0;                    % Represent D.
'Ttf(s)'                % Display label.
[num,den]=ss2tf(A,B,C,D,1) % Convert state-space
                           % representation to a
                           % transfer function represented as
                           % a numerator and denominator in
                           % polynomial form, G(s)=num/den,
                           % and display num and den.

  'LTI'                 % Display label.
Tss=ss(A,B,C,D)         % Form LTI state-space model.
'Polynomial form, Ttf(s)' % Display label.
Ttf=tf(Tss)             % Transform from state space to
                           % transfer function in polynomial
                           % form.

'Factored form, Tzpk(s)' % Display label.
Tzpk=zpk(Tss)           % Transform from state space to
pause                   % transfer function in factored
                           % form.
```